

lines to nearly double that in length. Some parts of the patches of eggs are of a much lighter colour than the rest.

On the third of May I found many of the eggs hatching, the little larvæ tumbling about in great numbers, with their bodies erected like the *Staphylinidæ*.

On putting them into water they swam about with the greatest activity, wriggling and undulating their bodies about much like a serpent or the tadpoles, and working their legs at the same time.

Their heads are remarkably large; but I have thought the accompanying sketch (Plate XIX. fig. 5) will better portray them than a written description, and I have also brought some of them alive and some eggs for exhibition.

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XLII. *Remarks on the Entomology of New Zealand.* By  
WM. STEPHENSON, Esq., Surgeon.

[Read 2d December, 1844.]

As the effects of insects, in harmonizing the productions of the earth in the grand scheme of the Omnipotent Being, are perhaps as much or even more conspicuous in New Zealand than in any other country, a few cursory remarks on the Entomology of these unexplored islands (drawn from observation on the spot) would no doubt be received with interest, had the task devolved upon one more capable of doing it justice.

It has been asserted in print that New Zealand affords few insects, but I am prepared with facts to prove that in those islands they abound in certain tribes; and the preponderance of some over that of others, in conjunction with divergency of form, will give an idea of the peculiarities of New Zealand Entomology. They are proportioned to the utility which each genus, tribe or family performs in a primeval world, where all is seen undisturbed by man. In this country, where vegetation is but slightly checked in winter by the frost, the face of which is extremely hilly, with deep precipitous ravines intervening, upon which there is a profusion of rain at all seasons, it may naturally be expected to be found as it is, viz. clothed with the most gigantic forms of vegetation.

The country is subject to frequent and very hard gales of wind, which tear up by the roots huge trees, mostly of hard wood, that being the general nature of New Zealand timber. These at different periods are sooner or later attacked by insects depositing their ova upon them in swarms, verified by observed effects. They are principally of the order *Coleoptera*, as far as my observations went, but Lepidopterous larvæ were also found in very limited proportions. The larvæ soon perforate the robust trunks and branches of these monsters of the forest, in order evidently to allow the moisture to penetrate for the purpose of hastening their decomposition; a further proof of which is afforded by the difference of time in which some of the species arrive at the imago state to that of others. I have noticed that the smaller species of *Coleoptera*, in their larva state, feed more superficially on the bark and soft exterior of the wood; but the larger ones, and some *Lepidoptera*, perforate, as with an auger, to the heart of the tree, increasing the caliber with the growth of the larvæ. The former I believe, in many instances, pass into the pupa state in one season, but the latter frequently remain three or more years previous to that change.

This seems ordained, in order to hasten the decay of the exterior, whilst the harder and more durable substance is being perforated more and more, in order to admit air and moisture. These borings are partially filled up by the excrementitious matter of the larvæ, which detains the water, and keeps the adjacent parts in perpetual moisture, materially hastening their decay. No sooner is a tree deprived of vitality, than it is attacked in rotation by various tribes of Coleopterous insects, the effects of which may be observed at any time in hundreds of instances, after they have accomplished their final change, and eaten their way out through the bark, in order to perform the duty of continuing the species.

The *Tetramera*, or Phytivorous beetles, seem to form three-fourths of the *Coleoptera* of New Zealand. I could only find two species of *Cicindela*; the larger is rather numerous on dry foot-paths; the smaller, of which I have only one specimen, was taken on a path in a wood; but I have seen others in similar situations with the first, but they are rare. In *Carabidæ* few species are to be found, and those thinly scattered. Aquatic *Coleoptera* were few in the localities which I visited.

In *Brachelytera* three or four species were procured, inhabiting decayed vegetable matter, putrid carcasses, &c. In *Serricornia* the *Elateridæ* are rather more numerous; two or three species were collected. No *Buprestidæ* could any where be found or

heard of, yet I cannot but believe they do exist; but New Zealand being a country not abounding in flowers, and as I left before the height of summer, it might have been too early for their appearance. I made every inquiry amongst woodcutters, timber merchants, &c. but could nowhere hear of any insect resembling them; and as they are frequently clothed in rich colours, they are objects of attraction to even unentomological eyes. I conclude, therefore, that if they do exist, they must either be very rare, or of obscure and sombre colours. The *Claviornia* are not numerous; a few interesting examples are the specimens of *Lucanidæ*, and were taken under bark and rubbish at the roots of trees, but require very diligent search. I was informed that, in the valley of the Hut River, a much larger species had been observed. A species, (*Mitophyllus irroratus*, Parry,) the lamellæ of whose antennæ (three in number) are as long as the rest of these organs, with projections from the anterior part of the head, in a vertical direction, resembling in this respect the *Goliathus*, was found under bark. The few examples of *Cetonia* which I procured were taken in promiscuous places, to which they had accidentally fled. I searched and beat all the flowering shrubs and trees in vain; they are evidently rare.

I could find no traces of *Geotrupidæ*, unless a small roundish, obscurely marked insect,—of which I took a considerable number under the rejectamenta of the sea, sometimes buried in the sand to the depth of six inches,—be considered one. I found under dry cowdung some small black species, resembling *Harpalus*, but which I believe had only made a common sheltering place thereof.

In *Heteromera* I found but two or three examples under bark, near the roots of decayed trees, but they are scarce. In *Tetramera* the numbers must be immense, from observed effects. The *Curculionidæ* are in some instances of singular form, and considerable beauty; all of which, as far as I observed, are wood-feeders. Two large rostrated species, allied to *Brentus*, feed in the larvæ state on the hard internal part of a tree, called, by the Maories, Pukatea, and are very abundant, but not easily procured. The *Longicornis* are also very abundant, particularly a large species, found in all its stages in the Kaikhatea (*Dacrydium excelsum*) in profusion; both the larva and pupa of this insect are sought after and eaten by the Maories, either in a raw state, or half roasted in hot ashes; I have seen them swallowed by scores, and pronounced *ka pai* (very good); all the remaining species were taken in or upon slightly decomposed wood, except two, one of which was taken by sweeping herbage, and the latter on a man's arm. An example or two of *Coccinellæ* were captured, but they are rarely seen.

The *Forficulæ* are not numerous ; two species were found under rubbish.

In *Hymenoptera* I observed only about seven or eight species, amongst which was a bee, with large burthens of farina on its hind legs ; but where it nidifies, and whether or not it produces honey, are questions that no doubt will soon be solved by the Rev. Mr. Cotton, present chaplain to the bishop, whose writings on Apiology are well known. In *Neuroptera* I observed five or six species of *Libellulæ* ; three were captured ; but the high winds, and their instinctive alertness, prevented further success. In *Homoptera* three species of *Cicada* were found ; the largest is a numerous species, and in fine weather makes a continual chirruping noise, which may be heard at a great distance on low brushwood, and on the *Phormium tenax*. A peculiarly formidable insect, allied to *Gryllus* (*Deinacrida*, White), is found in old trees, secreting itself in rents and crevices ; it is an abundant species, and carnivorous ; called by the Maories *Weta*. The male is distinguished from the other sex by its enormous head, the bite of which is very severe ; both sexes are apterous, the female very prolific in ova. I have seen two other species of this genus, the others I lost ; they are rare ; habitat as the first, but not in society with it ; all apterous. The small grasshoppers are most numerous, and afford many obscurely marked species. In *Diptera*, the carrion flies perform a more important part in nature, as scavengers in New Zealand, than I have observed in any other country ; they are large and very numerous, depositing living maggots. There is also a yellowish coloured one, which also deposits living maggots ; these arrive to the pupa state in six days, and to that of the imago in nine and a half days from the time of ejection.

The *Tipulidæ* are rather numerous and ornamental. Mosquitoes abound in some localities ; the species is of one obscure black colour. In *Lepidoptera* there are decidedly few species ; in *Diurna* I have seen about seven ; in *Noctuidæ* they are much more numerous, but the high winds, together with the economy of the larvæ, renders them very difficult to procure. There is a large caterpillar of a Lepidopterous insect, found feeding upon the stem and roots of the brassica, and other tribes of culinary vegetables. These are of a large size, nearly black ; are nocturnal feeders, burrowing in the earth during the day ; it appears to be an *Hepialus*, and is very destructive to gardens, &c.

The entomological climate of New Zealand would agree with the third of that of Latreille, and it is interesting to find a similarity

or approximation in species to some of the British ones, although separated by 174° of east longitude.

Amongst the diurnal *Lepidoptera* the Painted Lady is the most numerous; and there is a resemblance in another species to our Red Admiral, the principal difference being in an ocellated spot on the underside of the superior wings, connecting this with *Vanessa Io*. In the *Coleoptera* there are approximating species, particularly amongst *Carabi*; but there is a wide difference, in proportion to numbers, in different orders of insects in general. The *Coleoptera* preponderate greatly over all others, not so much in the number of species perhaps, as in the aggregate; but even this inequality might be expected, where the natural decay of large trees is to be completed.

The figure in Pl. XIX. 6, is a rough sketch of a supposed larva found in abundance in old potato grounds, about six or eight inches beneath the surface, at Motuaka, Nelson district, New Zealand. They are supposed to feed on the roots of the sow thistle, which is very common in such situations, because on their being crushed they contain a bland milky semi-fluid.\* I submit this to the notice of Entomologists, on the authority of a gentleman of strict veracity, who has left a friend and relation on the spot, from whom I have not the least doubt specimens may be obtained.

When the observer contemplates the grand scheme of Omnipotence, as displayed in adjusting and proportioning the quantities of order, family or tribe, with the effects they are destined to perform, together with their beautifully varied organization, as best befitting their economy, he cannot but feel a sublimity of thought unknown or unappreciated by unentomological minds. Insects, in common with the rest of the animated tribes, keep each other in check; and in addition to this, they perform the most herculean effects in the conversion of huge masses of hard timber into its mother earth, in order to fit it for reproduction, which they effect in an incredible short space of time; and thus the grand system is continued in a series of circumvolutions, independent of the aid of mankind.

The collector of insects has many insurmountable difficulties to cope with in New Zealand, which renders his efforts very unproductive.

In the first place, their food is so very abundant, that you must labour long and hard for few specimens. A powerful digger, such as I possessed, was of little comparative use. I have been strip-

\* This has more the appearance of an impregnated female, of an alliance to the *Termites*; they are seen of all sizes.

ping off bark, digging in rotten wood and at the roots of trees, for hours at a time, with no better success than two or three specimens, and yet the larvæ abound.

Again, travelling is very difficult and laborious, rendering it impossible to pursue a specimen on the wing with success.

I have examined trunks of trees in search of *Longicorns*, &c. but could find very few Coleopterous insects in the day-time in exposed situations. The gigantic lichens, parasites, &c. are so numerous on the old trees, in which they secrete themselves, and these being frequently from fifty to sixty feet high, renders it next to impossible to examine them. The night-trap, of which I exhibited a model, would have been useful in sheltered places, or in calm nights (which are rare), but I could not get one made in Port Nicholson. I was compelled to give up collecting objects of natural history, and therefore took my departure, after a short residence of four months. It is my intention to proceed out to some other country more prolific in specimens with as little delay as possible; but have not yet determined whether it shall be to California, Mexico or New Holland.

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